

Claims

1. A tower, comprising a tall metal lattice structure having a central vertical axis and certain apparatus for its anchoring to a foundation, concealed within a shell concentric with
5 said central vertical axis and further characterized, at any given level, by a closed cross-section which is either circular or equi-sided polygonal, said shell being internally secured to and supported by said metal lattice structure in an appropriate density throughout its area, so as to maintain its shape when subjected to wind loads or any other likely loads.
- 10 2. The tower according to claim 1, wherein said lattice structure includes at least three continuous leg members, each having either uniform or varying cross-section along its height, the axis of each leg being defined by either a straight or a broken line, contained within a vertical radial plane that is defined by and contains also said central vertical axis.
- 15 3. The tower according to any of claims 1 or 2, wherein said shell has the shape of either a cylinder or a truncated cone with a circular cross-section, or a prism or a truncated pyramid with an equi-sided polygonal cross-section.
- 20 4. The tower according to any of claims 1 to 3, wherein means for securing said shell to said lattice structure comprises an array of sufficiently stiff horizontal metal rings, having a respective circular or equi-sided polygonal shape, encircling and well fastened to said lattice structure, each in its designated level, the axes of all said rings being collinear with said central vertical axis and their exterior surfaces matching the internal surface of said shell in said designated levels respectively, said shell being mounted onto said array of
25 rings and fastened thereto.
5. The tower according to claim 4, wherein the entire height of said shell is divided, for fabrication and assembly purposes, into a plurality of separable shell sections respectively, each having transportable dimensions, such that each shell section is directly fastened to at
30 least one of said metal rings.

6. The tower according to claim 5, wherein the joint between every two adjacent said shell sections, once finally assembled, is made such that the bottom end of the upper of said sections is extending over the top end of the lower of said sections, so that a relatively small overlap exists there between, allowing vertical slip of the interior surface of the upper section relative to the exterior surface of the lower section.

7. The tower according to claim 6, wherein said joint is made such that a small gap exists between the exterior of the top end portion of the lower of said every two adjacent shell sections and the interior of the bottom portion of the upper of said two sections, and said gap is filled with a band of an elastic material, such as rubber, said band fulfilling a primary role of transmitting lateral forces between the bottom end of said upper section and the top end of said lower section while minimizing the transmission of vertical forces there between, and a secondary role of sealing the joint against wind-air or rain-water penetration.

8. The tower according to claim 6, wherein the top portion of the lower of said every two adjacent shell sections, where said joint is located, is dropped inwards all around, so as to make room for said overlap while keeping a substantially smooth and continuous exterior face of said shell sections on both sides of said joint.

9. The tower according to claim 7, wherein the top portion of the lower of said every two adjacent shell sections, where said joint is located, is dropped inwards all around, so as to make room for said overlap and said gap, while keeping a substantially smooth and continuous exterior face of said shell sections on both sides of said joint.

10. The tower according to any of claims 6 to 9, wherein each of said shell sections is fastened to only one of said metal rings, located behind the top end portion of the respective shell section.

11. The tower according to any of claims 5 to 10, wherein each, or any desired part of, said shell sections is further divided, for fabrication and assembly purposes, into a plurality

of horizontally detachable segments, such that every two adjacent segments are coupled along a substantially vertical seam there between.

12. The tower according to claim 11, wherein said seam between every two adjacent segments is made by two internally bent and vertically abutting lips, each forming an integral part of a respective one of said two adjacent segments, such that a substantially vertical radial plane of contact exists there between, which is defined by and contains also said central vertical axis, said two abutting lips being mechanically coupled by means of conventional bolting, riveting, gluing or the like.

13. The tower according to any of claims 5 to 12, wherein said shell is made of fiberglass material or any other composite material.

14. The tower according to any of claims 5 to 12, wherein said shell is made of relatively thin metal sheeting.

15. The tower according to any of claims 1 to 3, wherein means for securing said shell to said lattice structure comprises an array of sufficiently stiff, horizontally spaced apart metal beams, well fastened to said lattice structure, the axis of each of said metal beams being contained within a vertical radial plane that is defined by and contains also said central vertical axis ; the exterior surfaces of said metal beams matching the internal surface of said shell in said designated beam locations respectively, said shell being mounted onto said array of metal beams and fastened thereto.

16. The tower according to any of claims 1 to 3, wherein means for securing said shell to said lattice structure forms a part of the structure of said shell, and comprises an array of sufficiently stiff, horizontally spaced apart metal profiles, well fastened to said lattice structure, the axis of each of said metal profiles being contained within a vertical radial plane that is defined by and contains also said central vertical axis ; said shell being divided by said array of metal profiles into an array of separable longitudinal shell segments each of said longitudinal segments being fastened, along both its longitudinal, substantially vertical edges, to two of said metal profiles, adjacently located.

17. The tower according to claim 16, wherein each of said separable longitudinal shell segments is substantially planar, consequently the entire said shell has a shape of a prism or a truncated pyramid, with an equi-sided polygonal cross-section.

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18. The tower according to any of claims 16 or 17, wherein said entire shell is divided along its entire height into a plurality of separable shell sections, such that in every joint between every two adjacent shell sections:

said metal profiles are set apart into separate co-axial profile sections, with a relatively small gap there between, and

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said longitudinal shell segments are set apart into separable segment sections as well, but such that the upper segment section is extended, at its bottom, so as to overlap a relatively small portion at the top of the lower segment section in the joint.

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19. The tower according to any of claims 17 or 18, wherein the cross-section of each of said metal profiles is a "T" or an "I" shape, with outwardly facing flanges which are bent inwards, so that the angle between each of said flanges and said profile's web matches the angle between the plane defined by said planar shell segment and the radial plane defined by the axis of said metal profile and said central vertical axis.

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20. The tower according to claim 19, wherein said planar shell segments are mounted onto the exterior faces of said metal profiles' outwardly facing flanges, and the fastening there between is made by means of tap-screwing, riveting or bolting.

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21. The tower according to claim 19, wherein said planar shell segments are mounted onto the interior faces of said metal profiles' outwardly facing flanges, and the fastening there between is made by means of clamping bolts, installed on plates welded to said metal profiles' interior, so as to press said shell segments firmly against the inner surface of said metal profiles' outwardly facing flanges.

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22. The tower according to claim 21, wherein in each of the longitudinal connection between said shell segments and said metal profiles, an additional metal plate or smaller pro-

file is present, such that said clamping bolts press on said additional metal plate or smaller profile, so as to provide an improved effect of clamping the longitudinal edges of said shell segments continuously.

- 5 23. The tower according to any of claims 17 or 18, wherein the cross-section of each of said metal profiles is a flat plate, or a “T” shape with inwardly facing flanges, and each of said planar shell segments’ longitudinal edges is bent inwards forming a connection lip, such that in the installed state, each of said flat plates, or the webs of said “T” shapes, are located in between said connection lips of every two adjacent shell segments ; the two
10 abutting lips and the profile there between being fastened altogether by means of tap-screwing, riveting or bolting.

24. The tower according to any of claims 16 to 23, wherein said shell segments are made of fiberglass material or any other composite material, or any polymeric material.

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25. The tower according to any of claims 16 to 23, wherein said shell segments are made of relatively thin metal sheeting.